



Fact Sheet

US Army Engineer
Research and Development Center
Waterways Experiment Station

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Portable Seismic Pavement Analyzer

Purpose: Determine the flexural strength of in situ Portland cement concrete (PCC) pavement for use in pavement evaluation.

Background: The technology packaged in the portable seismic pavement analyzer (PSPA) was adapted from a larger version of the system known as the seismic pavement analyzer (SPA). The SPA was developed by Geomedia Research & Development for the Federal Highway Administration's Strategic Highway Research Program (SHRP) to diagnose problems with pavements in early stages. The PSPA is a miniature version of the SPA that is capable of monitoring the quality and thickness of PCC slabs. Three different seismic testing techniques are used: 1) impact echo, 2) ultrasonic body wave, and 3) ultrasonic surface wave. The quality is assessed by estimating the Young's modulus and shear moduli from ultrasonic surface wave and ultrasonic body wave velocities.



PSPA Setup for Testing

The thickness is determined from results obtained from the impact echo test. The moduli from the PSPA can be input into existing elastic layer evaluation procedures to determine allowable load carrying capacity of pavements. The US Army Engineer Waterways Experiment Station (WES) developed correlations between PSPA velocities and flexural strength of PCC under contract to the U.S. Air Force. Evaluation results are extremely sensitive to the flexural strength of the PCC layer. Presently, there is no method other than laboratory testing to determine the flexural strength of PCC.

Facts: The PSPA consist of a small metal box containing a high-frequency source and two accelerometers. A schematic of the PSPA is shown below. The receivers are connected to a data acquisition system consisting of a portable computer with data acquisition hardware and software. A test sequence requires less than 15 seconds, and the computer automatically outputs the shear modulus, thickness, impact-echo response, and Young's Modulus from the compression wave velocity. WES is fully equipped and staffed to determine material properties of PCC pavements utilizing the PSPA.

Point of Contact: For more information regarding SHRP performance grading of asphalt binders, contact Dr. Albert J. Bush, III at (601) 634-3545 or e-mail at bushal@wes.army.mil. General information on WES is available on the web site at <http://www.wes.army.mil>.